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EXAMINER	
LEGESSE, HENOK D	

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2861	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,620	ZAPKA ET AL.	
	Examiner	Art Unit	
	Henok Legesse	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/27/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-3, 7,10,19, and 22 are rejected under 35 U.S.C. 102(a) as being anticipated by Kitahara et al.(US 2005/0062799 / WO 03/080345).

Regarding claim 1, Kitahara et al teaches a droplet deposition apparatus (IJHU=Ink Jet Head Unit in fig.1) comprising a chassis (30a, 30b) and at least first and second actuator (see fig.1, paragraph 0089; actuators are disposed on the surfaces of 30a and 30b), each actuator comprising an electrically actuable droplet ejection actuator (10) and electrical drive circuitry (18b) to provide actuation signals to that droplet election actuator (10), wherein said chassis (30a, 30b) comprises two parallel, opposed thermal management surfaces (top of 30a and bottom of 30b), an internal fluid cavity (35) situated between said thermal management surfaces (top of 30a and bottom of 30b) such that fluid in said cavity establishes thermal contact with said surfaces (top of 30a and bottom of 30b) and fluid ports (36,37) arranged on the exterior of said chassis (30a,30b) and communicating with said internal cavity (35) for supply and circulation of fluid through said internal cavity (35); the first and second actuator being mounted respectively on the two thermal management surfaces (see fig.1, paragraph 0089).

Regarding claim 2, Kitahara et al further teaches both the droplet ejection actuator (10, fig.1) and the drive circuitry (18b) of each actuator (10) are in thermal contact with the associated thermal management surface (top of 30a and bottom of 30b) (see figs.1, 6; paragraphs 0088-0089).

Regarding claim 3, Kitahara et al further teaches each droplet ejection actuator (10, fig.1) comprises a body of piezoelectric material (10 is a piezoelectric member) mounted in thermal contact with the associated thermal management surface (top of 30a and bottom of 30b) (see figs.1, 6; paragraphs 0088-0089).

Regarding claim 7, Kitahara et al further teaches the chassis (30a, 30b in fig.1) is formed from first (30a) and second (30b) generally concave chassis parts (fig.1), each chassis part (30a and 30b) defining one of the thermal management surface parts (top of 30a and bottom of 30b) and the chassis parts (30a and 30b) combining to define said internal cavity (35, fig.2).

Regarding claim 10, Kitahara et al further teaches the internal cavity (35, figs.2, 6) comprises a separator (see figs.2, 6) dividing said internal cavity (35) into a first channel for providing thermal management for said droplet ejection actuators (10) (see fig.6; portion of 35 that is under actuator 10) and a second channel for providing thermal management for said electrical drive circuitry (18b) (see fig.6; portion of 35 that is under actuator 18b).

Regarding claim 19, Kitahara et al teaches droplet deposition apparatus (IJHU=Ink Jet Head Unit in fig.1) comprising a chassis (30a, 30b) and at least first and second actuator (see fig.1, paragraph 0089; actuators are disposed on the surfaces of 30a and 30b), each actuator comprising a body of piezoelectric material (10) defining an array of droplet ejection channels (12, figs.1, 4,25-28) and electrical drive circuitry (18b, figs.1, 6) to provide actuation signals, wherein said chassis (30a, 30b) comprises two parallel, opposed thermal management surfaces (top of 30a and bottom of 30b), an internal fluid cavity (35, fig.2) situated between said thermal management surfaces (top of 30a and bottom of 30b, fig.1,2) such that fluid in said cavity (35) establishes thermal contact with said surfaces (top of 30a and bottom of 30b) and fluid ports (36,37) arranged on the exterior of said chassis (30a,30b) and communicating with said internal cavity (35) for supply and circulation of fluid through said internal cavity (35); the first and second actuator being mounted respectively on the two thermal management surfaces (see fig.1, paragraph 0089; actuators are disposed on the surfaces of 30a and 30b), wherein both the body of piezoelectric material (10) and the drive circuitry (18b) of each actuator are in thermal contact with the associated thermal management surface (top of 30a and bottom of 30b).

Regarding claim 22, Kitahara et al teaches a droplet deposition apparatus (IJHU=Ink Jet Head Unit in fig.1) comprising a chassis (30a, 30b) and at least first and second actuator (see fig.1, paragraph 0089; actuators are disposed on the surfaces of

30a and 30b), each actuator comprising a body of piezoelectric material (10) and electrical drive circuitry (18b) to provide actuation signals, wherein said chassis (30a, 30b) is formed from first (30a) and second (30b) generally concave chassis parts, each chassis part (30a,30b) defining one thermal management surface (top of 30a and bottom of 30b) and the chassis parts combining to define an internal fluid cavity (35, fig.2) situated between said thermal management surfaces (top of 30a and bottom of 30b, figs.1,2) such that fluid in said cavity (35) establishes thermal contact with said surfaces (top of 30a and bottom of 30b) and fluid ports (36,37) arranged on the exterior of said chassis (30a,30b) and communicating with said internal cavity (35) for supply and circulation of fluid through said internal cavity (35); the first and second actuator being mounted respectively on the two thermal management surfaces (top of 30a and bottom of 30b) with the body of piezoelectric material (10) and the drive circuitry (18b) of each actuator being in thermal contact with the associated thermal management surface (top of 30a and bottom of 30b), wherein said internal cavity (35) comprises a separator (see figs.2,6) thereby dividing said internal cavity (35) into a first channel for providing thermal management for each said body of piezoelectric material (10) (see fig.6; portion of 35 that is under actuator 10) and a second channel for providing thermal management for each said electrical drive circuitry (18b) (see fig.6; portion of 35 that is under actuator 18b).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 4,12-14,16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. (US 2005/0062799 / WO 03/080345).

Regarding claims 4 and 20, Kitahara et al further teaches each body of piezoelectric material (10, figs.1, 4, 25-26) defines an array of droplet ejection channels (12) and wherein the apparatus comprises a nozzle plate (20 of figs.1, 4,25-26) which is disposed in a plane orthogonal to said thermal management surfaces (top of 30a and bottom of 30b) and which defines a first set of nozzles (see figs.1, 4; set of nozzles

disposed above 30a) for the droplet ejection channels (12) of the first actuator (actuator disposed on 30a in fig.1, paragraph 0089) and a second set of nozzles (see figs.1, 4; set of nozzles disposed on bottom side of 30b) for the droplet ejection channels (12) of the second actuator (actuator disposed on 30b in fig.1, paragraph 0089).

Kitahara et al further teaches the mutual alignment of the first (set of nozzles disposed on the top actuator 10 in figs.27, 28) and second (set of nozzles disposed on the bottom actuator 10 in figs.27, 28) sets of nozzles is made to be independent of the mutual alignment of the first (the top actuator 10 in figs.27, 28) and second (the bottom actuator 10 in figs.27, 28) actuator by using a common nozzle plate (20' of figs.27, 28).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the common nozzle plate 20' in figs.27, 28 of Kitahara et al in the ink jet head device of fig.1 of Kitahara et al in order to improve the alignment of nozzle arrays by using a single, common, nozzle plate. Also using a single / common nozzle plate makes the assembly of the ink jet head easier.

Regarding claims 12-14, and 16, Kitahara et al further teaches manufacturing of droplet deposition apparatus (figs.1-6, 25-28) in view of the fact that the above structure is taught (see the rejections of claims 1,3,4, and 7).

6. Claims 5,6,8,9,15,17,18,21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. in view of Smith et al.(US 6,503,964).

Regarding claims 5,6 and 15, Kitahara et al teaches substantially the claimed invention except for the chassis (30a, 30b fig.1) is formed of a material having a thermal conductivity greater than 1.2 W/mK.

However, Smith et al teaches highly thermally conductive plastic material that can be used in heat dissipation applications having thermal conductivity greater than 1.2 W/mK (col.3, lines 13-35).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the chassis of Kitahara et al using materials whose thermal conductivity is greater than 1.2 W/mK as taught by Smith et al. The motivation being such materials efficiently conduct heat while providing insulation against electrical conductivity thereby suppressing the occurrence of short circuits. The material is also highly moldable, lightweight and low cost (col.3, lines 21-35, of Smith et al).

Regarding claims 8 and 17, Smith et al further teaches heat dissipation devices can be made of moldable thermally conductive material such as thermal conductive polymer, plastic, using molding manufacturing process (col.2, lines 50-54, col.3, lines 1-10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize molding manufacturing process to form the chassis parts (30a, 30b fig.1 of Kitahara et a) in order to be able to easily form a more complex geometry that can improve the performance of the chassis at a lower cost.

Regarding claims 21 and 23, Kitahara et al as modified by Smith et al teaches all the inventions claimed in claims 21and 23 (see the rejection of claims 5 and 8 above).

Regarding claims 9 and 18, Smith et al further teaches Smith et al further teaches heat dissipation devices can be formed using machining manufacturing process (col.2, lines 18-32). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize machining manufacturing process to machine the thermal management surfaces (top of 30a and bottom of 30b fig.1 of Kitahara et al) for mutually alignment after combination of said chassis parts (30a, 30b) in order to make the surfaces of 30a and 30b flat.

7. Claims 11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. in view of Kawashima et al.(US 4,865,123).

Regarding claims 11 and 24, Kitahara et al teaches substantially the claimed invention except for the second channel (see fig.6; portion of 35 that is under actuator 18b) has a greater volume than the first channel (see fig.6; portion of 35 that is under actuator 10).

However, Kawashima et al teaches a cooling fluid supplying system (fig.1) having plurality of cooling modules (11a, 11b...) for cooling electronic components disposed on electronic board (10). The circulation lines (i.e. size of pipes 12, etc) is

selected such that the cooling fluid is sufficient to cover the amount of heat and the number of elements in the cooling module (fig.1; col. 2, lines 6-12, col.3, lines 38-42) (i.e. Kawashima et al suggests that for modules which require higher removal of heat due to the number of elements it covers etc, the size of the circulation lines should be larger).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the size/volume of the second channel is greater size/volume than the first channel based on the suggestion of Kawashima et al since the electrical drive circuitry 18b of Kitahara et al is much more sensitive to heat than that of the droplet ejection actuators 10 of Kitahara et al thereby suppressing the possibilities of failures drive circuitry 18b due to over heating.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henok Legesse whose telephone number is (571) 270-1615. The examiner can normally be reached on Mon - FRI, 7:30-5:00, ALT.FRI EST.TIME.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

H.L.

HL

08/23/2007

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SUPERVISORY PATENT EXAMINER